IN THE SPECIFICATION:

Please replace the paragraph on page 15, line 6 to 28 with the following:

Figure 1 illustrates an overview of the preferred embodiment of the Power Management Architecture ("architecture") 100, which contains one or more IED's 102~~, 103, 104, 105, 106, 107, 108, 109~~. The IED's 102~~-109~~ are connected to an electrical power distribution system 101, or portion thereof, to measure, monitor and control quality, distribution and consumption of electric power from the system 101, or portion thereof. The power distribution system 101 is typically owned by either a utility/supplier 130 or consumer 132 of electric power however some components may be owned and/or leased from third parties 134. The IED's 102~~-109~~ are further interconnected with each other and back end servers 120~~, 121, 122, 123, 124~~ via a network 110 to implement a Power Management Application ("application") 111 (~~not~~ shown as a part of IED 102). In the preferred embodiment, the network 110 is the Internet. Alternatively, the network 110 can be a private or public intranet, an extranet or combinations thereof, or any network utilizing the Transport Control Protocol/Internet Protocol ("TCP/IP") network protocol suite to enable communications, including IP tunneling protocols such as those which allow virtual private networks coupling multiple intranets or extranets together via the Internet. The network 110 may also include portions or sub-networks which use wireless technology to enable communications, such as RF, cellular or Bluetooth technologies. The network 110 preferably supports application protocols such as telnet, FTP, POP3, SMTP, NNTP, Mime, HTTP, SMTP, SNNP, IMAP, proprietary protocols or other network application protocols as are known in the art as well as transport protocols SLIP, PPP, TCP/IP and other transport protocols known in the art.

Please replace the paragraph on page 16, line 29 to page 16, line 5 with the following:

The Power Management Application 111 utilizes the architecture 100 and comprises power management application components which implement the particular power management functions required by the application 111. The power management application components are located on the IED 102~~-109~~ or on the back end server 120~~-124~~, or combinations thereof, and can be a client component, a server component or a peer component. Application components communicate with one another over the architecture 100 to implement the power management application 111.

Please replace the paragraph on page 16, line 6 to line 18 with the following:

In one preferred embodiment the architecture 100 comprises IED's 102~~-109~~ connected via a network 110 and back end servers 120~~, 121, 122, 123, 124~~ which further comprise software which utilizes protocol stacks to communicate. IED's 102~~-109~~ can be owned and operated by utilities/suppliers 130~~, 131~~, consumers 132~~-133~~ or third parties 134 or combinations thereof. Back end servers 120~~, 121, 122, 123, 124~~ can be owned by utilities/suppliers 130~~, 131~~, consumers 132~~, 133~~, third parties 134 or combinations thereof. For example, an IED 102~~-109~~ is operable to communicate directly over the network with the consumer back-end server 120~~, 121~~, another IED 102~~-19~~ or a utility back end server 123~~, 124~~. In another example, a utility back end server 123~~, 124~~ is operable to connect and communicate directly with customer back end servers 120~~, 121~~. Further explanation and examples on the types of data and communication between IED's 102~~-109~~ are given in more detail below.

Please replace the paragraph on page 16, line 19 to page 17, line 4 with the following:

Furthermore, the architecture's 100 devices, such as the back end servers 120~~-124~~ or IED's 102~~-109~~, can contain an email server and associated communications hardware and software such as encryption and decryption software. Other transfer protocols, such as file transfer protocols (FTP), Simple Object Access Protocol (SOAP), HTTP, XML or other

protocols know in the art may also be used in place of electronic mail. Hypertext Transfer Protocol (HTTP) is an application protocol that allows transfer of files to devices connected to the network. FTP is a standard internet protocol that allows exchange of files between devices connected on a network. Extensible markup language (XML) is a file format similar to HTML that allows transfer of data on networks. XML is a flexible, self describing, vendor-neutral way to create common information formats and share both the format and the data over the connection. In the preferred embodiment the data collection server is operable by either the supplier/utility 130~~, 131~~ or the customer 132~~, 133~~ of the electrical power distribution system 101. SOAP allows a program running one kind of operating system to communicate with the same kind, or another kind of operating system, by using HTTP and XML as mechanisms for the information exchange.

Please replace the paragraph on page 17, line 5 to line 23, with the following:

Furthermore, the application 111 includes an authentication and encryption component which encrypts commands transmitted across the network 110, and decrypts power management data received over the network 110. Authentication is also performed for commands or data sent or received over the network 110. Authentication is the process of determining and verifying whether the IED 102~~-109~~ transmitting data or receiving commands is the IED 102~~-109~~ it declares itself to be and in the preferred embodiment authentication includes parameters such as time/date stamps, digital certificates, physical locating algorithms such as cellular triangulation, serial or tracking ID's, which could include geographic location such as longitude and latitude. Authentication prevents fraudulent substitution of IED 102~~-109~~ devices or spoofing of IED 102~~-109~~ data generation in an attempt to defraud. Authentication also minimizes data collection and power distribution system 101 control errors by verifying that data is being generated and commands are being received by the appropriate devices. In the preferred embodiment encryption is done utilizing Pretty Good Privacy (PGP). PGP uses a variation of public key system, where each user has a publicly known encryption key and a private key known only to that user. The public key system and infrastructure enables users of unsecured networks, such as the

internet, to securely and privately exchange data through the use of public and private cryptographic key pairs.

Please replace the paragraph on page 17, line 31 to page 18, line 29 with the following:

Figure 2a illustrates a preferred embodiment where and IED ~~200~~ 102 contains several power management components 201, 202, 203 and power management circuitry 220. The power management circuitry 220 is operable to implement the IED's functionality, such as metering/measuring power delivered to the load ~~218~~ 150 from the electrical power distribution system ~~216~~ 101, measuring and monitoring power quality, implementing a protection relay function, or other functionality of the IED ~~200~~ 102. The IED ~~200~~ 102further includes a power management application components 211 coupled with the circuitry 220 and a protocol stack 212 and data communication interface 213. The protocol stack 212 and data communications interface 213 allow the IED ~~200~~ 102to communicate over the network 215. It will be appreciated that, as described below, the protocol stack 212 may include an interface layer which comprises the data communications interface 213. The power management application components 211 include software and/or hardware components which, alone, or in combination with other components, implement the power management application 111. The components 211 may include components which analyze and log the metered/measured data, power quality data or control operation of the IED ~~200~~ 102, such as controlling a relay circuit. The components 211 further include software and/or hardware which processes and communicates data from the IED ~~200~~ 102to other remote devices over the network 110 ~~215~~, such as back end servers 120 ~~121-124~~ or other IED's ~~200~~ 102 ~~(102-109)~~, as will be described below. For example, the IED ~~200~~ 102is connected to a load 150 ~~218~~. The power management circuitry 220 includes data logging software applications, memory and a CPU, which are configured to store kWh data from the load 150 ~~218~~ in a memory contained within the power management circuitry. The stored data is then read and processed by the components 201, 202 in the power management application 211. The components communicate with operating system components which contain the protocol

stack 212 and the processed data is passed over the network 110 ~~215~~ to the appropriate party via the data communications interface 213. One or more of the components 211 may communicate with one or more application components located on one or other IED's ~~200~~ 102 and/or one or more back end servers 120 ~~121-124~~.

Please replace the paragraph on page 18, line 30 through page 19, line 20, with the following:

Figure 2b illustrates an alternate preferred embodiment where an IED 102 ~~240~~ is provided which includes power management application components 290. A load 280 is connected to an IED 102 ~~240~~via the electrical power distribution system 101 ~~281~~. The IED 102 ~~240~~ is further connected to the network 110 ~~283~~. The IED 102 ~~240~~contains power management circuitry which is operable to implement the IED's functionality, such as receiving power and generating data from the load 150 ~~280~~. The IED 102 further includes a protocol stack layer 284 and a data communication interface 286 which allows the back end server 120 to communicate over the network 110 ~~283~~. The power management application components 290 include one or more components such as data collection component 250, an automated meter reading component 253 and a billing/revenue management component 252, which may be revenue certified, a peer-to-peer power management component 257, a usage and consumption management component 258, a distributed power management component 254, a centralized power management component 255, a load management component 259, an electrical power generation management component 260, an IED inventory component 261, an IED maintenance component 262, an IED fraud detection component 263, a power quality monitoring component 264, a power outage component 265, a device management component 251, a power reliability component 256, or combinations thereof. Furthermore, components contained on one IED 102 ~~240~~may operate simultaneously with components on ~~an IED 102-109, 200 or~~ another IED 102 ~~240~~ or back end server 120 (not shown). More component details and examples are given below.

Please replace the paragraph on page 19, line 21 to page 20, line 31 with the following:

In one embodiment the application components comprise software components, such as an email server or an XML or HTTP server. These servers may include a Microsoft Exchange server or a BizTalk framework/XML compatible server. A Microsoft Exchange™ server is an email server computer program manufactured by Microsoft Corporation, located in Redmond, Washington, typically operating on a server computer which facilitates the reception and transmission of emails, and forwards emails to the email client programs, such as Microsoft Outlook™, of users that have accounts on the server. BizTalk is a computer industry initiative which promotes XML as the common data exchange for e-commerce and application integration over the internet. BizTalk provides frameworks and guidelines for how to publish standard data structures in XML and how to use XML messages to integrate software components or programs. Alternately, hardware components, such as a dedicated cellular phone, GPS encryption or decryption key or dongle are included in the components. In a further embodiment, a combination of both hardware and software components are utilized. Additionally, referring back to Figure 1, one or more power management application components 290 can utilize the architecture 100 to implement their functionality. For example, a utility 130 has a back end server 120 ~~124~~ which contains power management application and associated components, such as a usage and consumption monitoring component 258. The utility 130 supplies power to a consumer 132 via the power distribution network 101 and monitors the consumers power consumption using the power management application components on the back end server 120 ~~124~~ which communicates with the customer's IED's 102 ~~104, 105, 108~~ via the network 110 to retrieve measured consumption/usage data. The consumer 132 concurrently monitors usage of loads 150~~, 151, 153,~~ using an IED 102 ~~104, 105, 108~~ which is connected to the network 110, computing real time costs posted by the utility 130. In one embodiment, the consumer 132 monitors usage using their own back end server 120 which receives usage and consumption data from the customer's IED's 102 ~~104, 105, 108~~ via the network 110. The customer's IED 102 ~~104, 105, 108~~ implements power management application components such as load management components and billing management components. The customer's and utility's back end

servers 120~~, 124~~ implements power management application components such as a data collection component, a billing/revenue management component, an automated meter reading component or a usage/consumption management component. The components on the IED 102 ~~104, 105, 108~~ work in concert with the components on the back end server 120~~, 124~~ via the network 110 to implement the overall power management application. In a further embodiment, one or more power management application components are operating on IED 102 ~~104, 105, 108~~ and/or back end servers 120~~, 124~~ at any given time. Each power management application can be utilized by one or more users, or different applications can be used by different users. Moreover, the application components can exist on the same or different IED's 102 ~~104, 105, 108~~ or back end servers 120~~, 124~~.

Please replace the paragraph on page 21, line 1 to 29 with the following:

In the preferred embodiment, the data collection component 250 enables an IED 102 to collect and collate data from either a single or multiple sources via the network 110. The data collected by the component is stored and can be retrieved by other components of the power management application components 290, or other components implemented on other IED's 102~~-109~~ located on the network 110. In the preferred embodiment the Automated Meter Reading component 253 is utilized to allow either the consumers 132~~, 133~~ or providers 130~~, 131~~ to generate power management reports from the IED data. In the preferred embodiment the electrical power generation management component 260 analyzes data received from IED's 102~~-109~~ to either minimize or maximize measured or computed values such as revenue, cost, consumption or usage by use of handling and manipulating power systems and load routing. IED inventory, maintenance and fraud detection component 261, 262, 263 receive or request communications from the IED's 102~~-109~~ allowing the power management application to inventory the installed base of IED's 102~~-109~~, including establishing or confirming their geographic installation location, or check the maintenance history of all connected IED's 102~~-109~~. These power management applications aid in confirming outage locations or authenticating communications to or from an IED 102~~-109~~ to prevent fraud and minimize errors. In one embodiment, the IED inventory component 261

utilizes cellular triangulation technologies, or caller ID based geographic locator technologies to determine and verify IED inventories. In the preferred embodiment the fraud detection component 263 further detects device tampering. In the preferred embodiment the power quality monitoring component 264 monitors and processes electric parameters, such as current, voltage and energy which include volts, amps, Watts, phase relationships between waveforms, kWh, kvAr, power factor, and frequency, etc. The power quality monitoring component 264 reports alarms, alerts, warnings and general power quality status, based on the monitored parameters, directly to the appropriate user, such as customers 132~~, 133~~ or utilities 130~~, 131~~.

Please replace the paragraph on page 21, line 30 through page 22, line 18, with the following:

Figure 3a illustrates a preferred embodiment of an IED 102 ~~302~~ for use with the disclosed power management architecture 100. The IED 102 ~~302~~ is preferably coupled with a load 150 ~~301~~ via a power a distribution system 101 ~~300~~, or portion thereof. The IED 102 ~~302~~ includes device circuitry 305 and a data communications interface 306. The IED 102 ~~302~~ is further coupled with a network 110 ~~307~~. The device circuitry 305 includes the internal hardware and software of the device, such as the CPU 305a, memory 305c, firmware and software applications 305d, data measurement functions 305b and communications protocol stack 305e. The data communication interface 306 couples the device circuitry 305 of the IED 102 ~~302~~ with the communications network 110 ~~307~~. Alternate embodiments may have power management control functions 305b in place of data measurement circuitry. For example, a relay may include a control device and corresponding control functions that regulate electricity flow to a load based on preset parameters. Alternately a revenue meter may include data measurement circuitry that logs and processes data from a connected load 150. IED's 102 may contain one or the other or combinations of circuitry. In an alternate embodiment the circuitry includes phasor monitoring circuits (not shown) which comprise phasor transducers that receive analog signals representative of parameters of electricity in a circuit over the power distribution system 101. Further detail and discussion regarding the

phasor circuitry is discussed in U.S. Patent Application Serial No. 08/798,723, captioned above.

Please replace the paragraph on page 22, line 19 to page 23, line 2 with the following:

Figure 3b illustrates a more detailed embodiment of the IED's <u>102</u> ~~310~~ power management application components 311 and protocol stacks. The IED <u>102</u> ~~310~~ includes power management application components 311, a communications protocol stack 312 and a data communications interface 313 (as was noted above, in alternate embodiments, the protocol stack 312 may include the data communications interface 313). The application components 311 includes a Load management component 315a, which measures the load's 317 consumption of electrical power from the portion of the power distribution system <u>101</u> ~~316~~, a Power Quality component 315b, which measures power quality characteristics of the power on the portion of the power distribution system <u>101</u> ~~316~~, and a billing/revenue management component 315c, which computes the quantity and associated value of the incoming power. The power management components are connected to the network via the data communications interface 312 using the communications protocol stack 312 (described in more detail below).

Please replace the paragraph on page 23, line 3 to line 20 with the following:

In one embodiment, a Billing/Revenue Management component on a back end server receives the billing and revenue computations over the network 307 from the billing/revenue management component 315c on the IED <u>102</u> ~~310~~. These computations are translated into billing and revenue tracking data of the load <u>150</u> ~~317~~ associated with the IED <u>102</u> ~~310~~. The Billing/Revenue Management component on the back end server then reports the computations to the appropriate party operating that particular back end server or subscribing to a service provided by the operator the back end server, either the consumer or provider of the electrical power. Additionally, the Billing/Revenue Management component 315c on the

IED 310 or the Billing/Revenue Management component on the back end server computes usage and cost computations and tracking data of the associated load and reports the data to the appropriate party. In a still another embodiment, IED <u>102</u> ~~310~~ transmits billing and revenue data directly to the Billing/Revenue Management component over the network <u>110</u> ~~307~~ and the Billing/Revenue Management component computes usage and cost computations and tracking data of the associated load and reports the data directly to the appropriate party. Furthermore, tariff data received from the utility by the Billing/Revenue Management component 315c is factored into usage or cost computations.

Please replace the paragraph on page 26, line 30 to page 27, line 17 with the following:

In an alternate embodiment the Security Sub-layer 321a may include multiple encryption keys, each conferring different access rights to the device. This enables multiple users, such as a utility and customers, or multiple internal departments of a utility or customer, to send or receive data and commands to or from the IED <u>102</u>. For example a customer's IED <u>102</u> sends out two encrypted messages, one billing data and one power quality data, to the customer's office site. The billing data message is encrypted at a level where only the internal accounting department has access to decrypt it. The power quality data message is encrypted at a different level where the entire company can decrypt the message. Furthermore, in the preferred embodiment, commands sent to or from the IED <u>102</u> are coupled with the appropriate encryption key. For example, the IED's <u>102</u> Security Sub-layer 321a may only permit billing reset commands to be received and processed if the command has been authenticated where the point of origin was the appropriate customer or utility. Further, encrypted email messages may also include various encrypted portions, each accessible and readable with a different encryption key. For example an IED <u>102</u> sends out one message to both the utility and the customer containing billing data and power quality data. The data is encrypted with two different encryption keys so only the utility can decrypt the power quality data and only the customer can decrypt the billing data.

Please replace the paragraph on page 27, line 18 to line 30 with the following:

In operation the IED 102 monitors the power distribution system 101 ~~300~~ for billing events such as, kWh or kvA pulses. In one embodiment the IED 102 may store billing events and transport the data to the power management application components operating on a back end server 120 either upon request or upon pre-determined time intervals. Alternately the IED 102 may transport billing event data in real time to the back end server 120. Data may be filtered through the either the Back End Server's 120 or IED's 102 power management components or any combination or variation thereof, before being entered into the Billing/Revenue Management component where billing, revenue, cost and usage tracking are computed into revised data. The Billing/Revenue Management components either stores the computations for future retrieval or pushes the revised data to the appropriate party, such as the consumer 132 or provider 130 of the electric power system 101. Data can be retrieved upon command or sent or requested upon a scheduled time.

Please replace the paragraph on page 28, line 6 to line 19, with the following:

The IED 102 ~~402~~ implements power management functions on the whole electrical power distribution system 101 ~~400~~ or just a portion thereof. Referring to Figure 4a the IED 102 ~~402~~ monitors the electrical power via the system 101 ~~400~~ to a load 150 ~~401~~ and reports events and data to the power management application components 411 through the network 110 ~~410~~. The power management application components 411 are preferably operating on a back end server 120. The events and data are collected and processed through the automated meter reading components, billing/revenue management components or a combination and variation thereof, and revised data or commands are sent back to the IED 102 through the network 110 ~~410~~, enabling control of the power flow and distribution of the loading on the power distribution system 101. The automated meter reading component allows for retrieval and collection of data for the customer 132, utility 130 or third party 134. The component

further allows for schedule driven, event driven or polling commands which are operable to push data onto the network 110.

Please replace the paragraph on page 28, line 20 to page 29, line 9 with the following:

The power management functions implemented by the IED's 102 enables the back end servers or IED's 102 to control power flow and distribution over the electrical power distribution system. Specifically the power management application components process power measurement data and generate power measurement and reporting commands, transmitting them to the back end servers or IED's 102 for execution. Referring now to Figure 4b, in one preferred operation a load is monitored by a IED 102 where kvA and kWh pulse data are sent in real time over the network 110 ~~424~~ to the Application via email or another transport protocol. If pre-processing is required 425a the raw pulse data is transported into a data collection server or component where it is translated into a format readable by the billing/revenue management component 426. Alternately, the billing/revenue management component may be configured to receive and process data without pre-processing 425b. Once sent to the billing/revenue management component 428 the data is compared and analyzed for usage, consumption or billing revenue ranges against a pre-determined tariff structure (430, 432 in figure 4b) where any anomalies, excess or shortages are reported back to the IED 102 in the form of a command to a power management function which controls the power flow and load distribution accordingly 434. The components further contact the required parties, such as the consumer 132 or provider 130 of the load 150, over the network 110, forwarding power quality, billing, usage or consumption reports or any power management functions that were required against the set tariff structure (436 in figure 4b).

Please replace the paragraph on page 29, line 10 to line 28with the following:

Figure 5a illustrates a preferred embodiment for a usage and consumption management application of the power management architecture. The IED 102 ~~502~~ implements a power management function of controlling the source of electrical power for the load 150 ~~501~~ from either energy supplier 1 130 ~~505~~ or energy supplier 2 130 ~~506~~. The application is designed to take advantage a deregulated marketplace and operate the load 150 ~~501~~ from the most cost efficient energy supplier 130 at the given time period. Which supplier 130 is most efficient may fluctuate frequently as a function of the energy market and supply and demand for electrical power. Referring to Figure 5b, the IED 102 ~~502~~ contains a usage and consumption management component which receives tariff and cost structures from multiple energy suppliers 130 ~~505, 506~~. The component receives usage and consumption from the Load 150 ~~501~~ and compares actual usage against multiple tariff structures choosing the most cost effective provider for a given load. Similarly the load management component 259 , as shown in Figure 2b, is utilized to connect and disconnect loads to and from the electrical distribution system during either low and high rate and demand periods, hence reducing the electrical power costs and demand. In the preferred embodiment the load management component 259 is programmed to run in an automated fashion based on feedback from the system, however in an alternate embodiment the component is operated manually based on user input.

Please replace the paragraph on page 29, line 29 page 30, line 10 with the following:

For example, an IED 102 ~~502~~ is connected to a power line 101 ~~500~~ and associated load 501. The IED 102 ~~502~~ measures power usage by the load 150 (511, 512 Figure 5b) and transmits this consumption data 514 over a network 110 ~~510~~ to a usage and consumption management application component operating on a back end server 120 (not shown). The Usage and consumption management component receives and tracks cost and usage 516, 518 and compares rates for actual usage against multiple suppliers 130 bids 522. Suppliers 130 have the option to either push tariff structures to the application component or have tariff structures polled over the network 110. Once the most cost effective structure is determined by the usage and consumption management component, a command or function is sent to the

IED 102 ~~502~~ with the new tariff structure 523, 524. Alternately, the new tariff structure is applied across to the billing/revenue management component where billing is applied to the usage and revenue reports are forwarded onto the appropriate parties.

Please replace the paragraph on page 30, line 11 to line 16, with the following:

In another example the usage and consumption management component determines all suppliers tariff structures are too expensive to warrant usage or consumption thus a command to reduce consumption to a desired level is transmitted over the network 110 to the IED 102 ~~525~~. Furthermore, an alternate embodiment includes application of real-time usage and cost monitoring of loads being measured by an IED 102 and multiple energy and distribution system suppliers 130.

Please replace the paragraph on page 30, line 17 to line 25, with the following:

In an alternate embodiment the usage and consumption component is pre-programmed to monitor and shed loads based on a exceeding a set tariff structure. For example an IED 102 ~~502~~ monitors a load 150 ~~501~~ connected to a power distribution system 101 ~~500~~. Energy is supplied by an energy supplier 130 ~~505~~. The IED 102 contains a tariff structure that has a limit of $0.80/kWh during peak hours of 6 am to 6 pm and a limit of $0.60/kWh for non-peak hours of 6 pm to 6 am. The IED 102 ~~502~~ monitors the power usage of the load 150 ~~501~~ vs. the actual tariff structure of the energy supplier and shuts the load 150 ~~501~~ off if the actual tariff exceeds the limits of $0.80/kWh during peak times or $0.60/kWh during non-peak times.

Please replace the paragraph on page 31, line 3 to page 32, line 5 with the following:

The distributed power management component 254 allows for the distribution of work or data processing to various devices on the network. In operation, an IED 102 measures or detects an occurring or impending catastrophic power quality event and alerts other downstream IED's 102 (on the power distribution network 101) of the event thereby giving the downstream IED's 102 an opportunity to disconnect or alter loads 150 before the event reaches the downstream system and causes damage. The component further includes a function that, upon detection of an occurring or impending event, alerts downstream IED's 102 or back end servers 120 to alert their connected loads 150 to either protect themselves from the outage by shutting down, or instructing them to shut down applications that may cause critical failure or damage if interrupted, such as writing to a hard-drive. Figure 6 illustrates a preferred embodiment of the distributed power management component in action. An Electrical power distribution system 101 ~~600~~ distributes energy over distribution lines 601 which are connected to multiple IED's 102 ~~620, 622, 624, 626~~ which are present to continuously monitor the energy being fed onto their respective loads 150 ~~621 623~~ and generators 152 ~~625 627~~ on a given branch and furthermore all IED's 102 ~~620, 622, 624, 626~~ are connected via a network 610 as described above. IED's 102 ~~616, 618~~ are also present on the distribution system 101 ~~600~~ to continuously monitor energy being transferred onto the system 101 as a whole. It will be appreciated that the loads 150 and generators 152 may reside on multiple or separate consumer 132 sites. In operation, a catastrophic power quality event is detected on a load 150 ~~623~~ by the attached IED 102 ~~622~~. The IED 102 ~~622~~ takes appropriate action, such as triggering a protection relay (not shown), on the load 150 and further transmits communications of its actions to upstream IED's 102 ~~616, 618~~. This ensures local containment of the event by the "detecting" IED 102 ~~622~~ informing upstream IED's 102 to not duplicate the action on the larger system 101. Obviously retaining upstream IED's 102 as a backup is not discounted in this operation. Alternatively, the operation is utilized to coordinate downstream IED's 102 over the network 110 ~~610~~. For example an event may be detected at the distribution system 101 ~~600~~ by an IED 102 ~~616~~ monitoring the system 101 ~~600~~ which triggers, for example, a protection relay. The IED 102 ~~616~~ which triggered the protection relay (not shown) communicates its actions to downstream IED's 102 ~~618, 620, 622, 624, 626~~ over the network 110 ~~610~~ allowing them to take appropriate intelligent action, such as disconnection the generators 152 ~~625, 627~~. It can be appreciated

that IED 102 applications may include a combination of the centralized and distributed power management components.

Please replace paragraph on page 32, line 6 to line 17 with the following:

In one embodiment, a power reliability component 256 is provided in the IED to measure and compute the reliability of the power system. Power system reliability is discussed in commonly assigned U.S. Pat. Application Ser. No. 09/724,309, now U.S. Patent No. 6,671,654, "APPARATUS AND METHOD FOR MEASURING AND REPORTING THE RELIABILITY OF A POWER DISTRIBUTION SYSTEM", captioned above. In the preferred embodiment the component 256 computes and measures reliability as a number of "nines" measure. The component includes a function which compiles the reliability of the power from other components located on back end servers 120 or IED's 102, giving a total reliability. This function also enables a user to determine which part of the distribution system has the most unreliable power. Knowing this enables the user to focus on the unreliable area, hopefully improving local power reliability and thus increasing overall reliability.

Please replace the paragraph on page 32, line 18 to 27 with the following:

For example, referring now to Figure 7, an IED 102 ~~711~~ is connected to a network 110 ~~710~~ and measures the reliability of the power distribution system 101 ~~701~~ which supplies power to loads 150 ~~722, 724~~ within a customer 132 site 705. The customer 132 also provides a generator 152 ~~726~~ which supplies power to the loads 150 ~~722, 724~~ at various times. The customer 132 measures the power reliability of the system 101 for the load 150 ~~722, 724~~ using the associated IED 102 ~~712, 714~~ and considers it unreliable. One IED's 102 ~~714~~ power reliability component polls the other IED's 102 ~~711, 712, 716~~ and determines the unreliable power source is coming from the generator 152 ~~726~~. From this the customer can decide to

shut off the power supply from the generator 152 ~~726~~ in order to improve the power reliability of the system 101.

Please replace the paragraph on page 33, line 7 to 18 with the following:

Peer to peer communications between IED's 102 and between back end servers 120 are supported by the peer to peer management component 257. In the preferred embodiment peer to peer communications are utilized to transport or compile data from multiple IED's 102. For example, as shown in Figure 8, an IED 102 ~~800~~ is connected to a network 110 ~~810~~. Multiple loads 150 ~~806, 808~~ draw power from a power utility's 130 ~~803~~ power distribution line 101 ~~801~~ and each load 150 is monitored by an IED 102 ~~802, 804~~. An IED 102 ~~800~~ polls load and billing data from all other IED's 102 on the network 110 on the customer 132 site 802, 804. Upon request, the IED 102 ~~800~~ then transmits the load and billing data to the customer's billing server 120 ~~814~~. In the preferred embodiment, the IED 102 ~~800~~ communicates the load and billing data in a format which allows software programs inside the customer billing server 120 ~~814~~ to receive the data directly without translation or reformatting.

Please replace the paragraph on page 34, line 11 through page 35, line 18, with the following:

Transmission in XML format allows the recipient to receive XML-tagged data from a sender and not require knowledge of how the sender's system operates or data formats are organized. In a preferred embodiment, communications between IED's 102 connected to the network 110 are transmitted in XML format. An IED 102 utilizes XML based client application components included within the power management applications and transmits the data in XML format so little or no post-processing is required. Figure 9 illustrates an example of the preferred embodiment. An IED 102 ~~902~~ is connected to a power distribution line 101 ~~900~~ and associated load 150 ~~901~~ owned by a customer 132 ~~920~~. Power is supplied

by a power utility's 130 ~~908~~ power generator 152 ~~903~~. The power utility 130 also has a utility billing server 120 ~~906~~ which compiles billing data from consumers 132 drawing power from their power generators 152. The IED 102 ~~902~~ is connected to the utility billing server 120 via a network connection 110 ~~910~~ and the IED 102 ~~902~~ measures usage and consumption of the load 150, and other values associated with billing. The utility billing server 120 ~~906~~ contains billing software, such as a MV90, which requires data in a specified format. Either upon request, or a pre-scheduled times, the IED 102 ~~902~~ transmits the usage, consumption and billing data associated with the load 150 ~~901~~ to the utility billing server 120 ~~906~~ in XML format. The customer 130 also has a monitoring server 120 ~~921~~ which is dedicated to receiving billing data from the IED 102 ~~902~~ and reporting usage and consumption to the appropriate parties, the monitoring server 120 ~~921~~ also reads data in a specified format for its associated monitoring software. The IED 102 ~~902~~ transmits the same usage, consumption and billing data to the monitoring server 120 ~~921~~ in XML format. By utilizing XML data formats the data transmitted by the IED 102 ~~902~~ can be read by multiple servers or IED's 102 ~~902~~ that do not require knowledge beforehand of the order or type of data that is being sent. In an alternate embodiment an IED 102 ~~902~~ may also receive inputs from peripheral devices which may be translated and combined in the XML transmission. For example, the load 150 ~~901~~ is a motor which contains a temperature probe. The temperature probe is connected to the IED 102 ~~902~~ and allows the IED 102 ~~902~~ to monitor the motor temperature in addition to power data on the power distribution line 101 ~~900~~. The IED 102 ~~902~~ is programmed to act on the temperature input by shutting down the motor if the temperature exceeds a pre-defined critical level by tripping a relay or other protection device (not shown). The IED 102 ~~902~~ is further programmed to alert the customer monitoring server 120 ~~921~~ and an alert pager 922 and if such an action takes place. This alert transmission is sent in XML format so both the server 120 ~~921~~ and the pager 922, which may be configured to read incoming transmissions differently, receive the alert transmission in the form it was intended. It can be appreciated that the IED 102 ~~902~~ can receive data in XML format from multiple sources without complete knowledge of their file transfer notations.

Please replace the paragraph on page 35, line 19 through page 36, line 19, with the following:

In an alternate embodiment the back end servers 120 include software that is generally included on a majority of existing computer systems, such as Microsoft Office™ software, manufactured by Microsoft Corporation, located in Redmond, Washington which includes the software applications Microsoft Word™ and Microsoft Excel™. The software receives data in a self describing format, such as XML, and the software includes off the shelf applications and processes such as a Microsoft Exchange Server, Microsoft Excel and associated Excel Workbooks, Microsoft Outlook and associated Outlook rules, Microsoft Visio and associated Visio Stencils, Template files, and macros which allow the user to view and manipulate data directly from the IED 102. In one embodiment the IED 102 transmission format makes use of existing standard software packages and does not require additional low level components, such as a communications server communicating with a serial port, which are normally required to interface to the IED 102 communication ports. Further, the embodiment does not require a separate database, as the data is stored in the software programs. This allows a user to view data from the IED 102 using standard computer software. For example, referring now to Figure 10, an IED 102 ~~1002~~ monitors a load 150 ~~1001~~ and passes the monitored data to a monitoring server 120 ~~1011~~. The data can be transmitted using a variety of protocols, such as FTP, TCP/IP or HTTP, as described above. In the preferred embodiment data is transmitted in an HTTP based form or an SMTP form where the HTTP form is a self-describing format such as XML and the SMTP format is an email message. The monitoring server 120 ~~1011~~ includes Microsoft Exchange Server 1022, Visio 1021, Microsoft Excel 1020 and Excel Workbooks 1023. The Excel software 1020 is capable of receiving data directly from the IED 102 in a self-describing format, thus allowing the user to view real time load profiles or graphs and other monitored data directly from the IED 102 in real time. The Visio software 1021 is also capable of receiving data directly from the IED 102 in a self-describing format, thus allowing the user to process and view real time data in Visio format. Alternately, the IED 102 transmits power quality, load, billing data or other measured or monitored values to the Excel Workbooks 1023 via the

Exchange Server 1022. The Excel or Visio software is then capable of retrieving historical data directly from the workbooks.

Please replace paragraph on page 36, line 20 to page 37, line 10 with the following:

Referring to Figure 11, there is shown an exemplary screen display of a Microsoft Excel worksheet which is coupled with the IED 102 ~~1002~~ as described above. In this example, the IED 102 ~~1002~~ is a model 8500 meter, manufactured by Power Measurement Limited, in Victoria, British Columbia, Canada. The IED 102 ~~1002~~ is coupled via a TCP/IP based network with a personal computer having at least 64 MB memory and 6 GB hard disk with a Pentium™ III or equivalent processor or better, executing the Microsoft Windows 98™ operating system and Microsoft Excel 2000. The computer further includes Microsoft Internet Explorer ™ 5.0 which includes an XML parser that receives and parses the XML data from the meter and delivers it to the Excel worksheet. The worksheet displays real time data received directly from the IED 102 ~~1002~~ in an XML format. As the IED 102 ~~1002~~ detects and measures fluctuations in the delivered electrical power, it transmits updated information, via XML, to the worksheet which, in turn, updates the displayed data in real time. Note that all of the features of the Microsoft Excel program are available to manipulate and analyze the received real time data, including the ability to specify mathematical formulas and complex equations which act on the data. Further, display templates and charting/graphing functions can be implemented to provide meaningful visual analysis of the data as it is received. Further, the real time data can be logged for historical analysis. In one embodiment, the activation of a new IED 102 ~~1002~~ on the network is detected by the worksheet which cause automatic generation of a new worksheet to receive and display data from the new device.
